



## FORMATO DE INFORME

### I. PORTADA

UNIVERSIDAD TÉCNICA DE AMBATO  
Facultad de Ingeniería en Sistemas, Electrónica e Industrial

Título:	Prueba 2do Parcial
Carrera:	Ingeniería en Tecnologías de la Información
Nivel y Paralelo:	5 TI "A"
Alumnos participantes:	Jonathan Manobanda
Asignatura:	Investigación Operativa
Docente:	Ing. José Rubén Caiza Caizabuno

### II. INFORME DEL PROYECTO

#### 2.1 Título

Prueba 2do parcial

#### 2.2 Objetivo

DISEÑAR Y EVALUAR, EN GOOGLE CLOUD, CINCO ESQUEMAS DE REPLICACIÓN DE BASES DE DATOS

#### 2.3 Resultados y Discusión (Desarrollo)

Capturas de evidencia para cada replicación

##### RED

Agrega una subred >

Nombre \*

hospital-vcp2 ⓘ

Se permiten letras minúsculas, números y guiones

Descripción

prueba parcial ⓘ

Red de VPC

main

Región \*

us-east1 ⓘ

Propósito

☐ Proxy administrado regional ⓘ

☐ Proxy administrado entre regiones ⓘ

☐ Private Service Connect ⓘ

☐ NAT privada ⓘ

☐ Migración por intercambio de tráfico ⓘ

☒ Ninguno

Tipo de pila de IP ⓘ

☒ IPv4 (una sola pila)

☐ IPv4 e IPv6 (pila doble)

☐ IPv6 (pila única)

Rango IPv4 principal

☐ Asociar con un rango interno

Usa un rango interno para especificar el rango de direcciones IP internas de la subred. La subred se puede asociar con un rango interno completo o solo con una parte del rango.

Rango IPv4 \*

10.128.0.0/20 ⓘ

P. ej., 10.0.0.0/24



hospital-vcp2

Red de VPC

[main](#)

Región

us-east1

Tipo de pila de IP

IPv4 (pila única)

Rango IPv4 principal

Rango IPv4 principal	Tipo de acceso	Rango interno reservado
10.128.0.0/20	Internal	Ninguno

Puerta de enlace

10.128.0.1

Acceso privado a Google

Desactivado

Hybrid Subnets [?](#)

Desactivado

[REST equivalente](#)

Instancias de VM

[Filtro](#) Ingresar el nombre o el valor de la propiedad

<input type="checkbox"/>	Estado	Nombre ↑	Zona	Recomendaciones	En uso por	IP interna	IP externa	Conectar
<input type="checkbox"/>	✓	<a href="#">hospital-guayaquil</a>	us-east1-c			10.128.0.4 ( <a href="#">nic0</a> )	<a href="#">34.138.97.31</a> ( <a href="#">nic0</a> )	SSH ▾ ⋮
<input type="checkbox"/>	✓	<a href="#">hospital-principal-quito</a>	us-east1-c			10.128.0.5 ( <a href="#">nic0</a> )	<a href="#">34.138.196.138</a> ( <a href="#">nic0</a> )	SSH ▾ ⋮
<input type="checkbox"/>	✓	<a href="#">ubuntu-22ts-1</a>	us-east1-c			10.128.0.2 ( <a href="#">nic0</a> )	<a href="#">34.23.230.158</a> ( <a href="#">nic0</a> )	SSH ▾ ⋮
<input type="checkbox"/>	✓	<a href="#">ubuntu-22ts-2</a>	us-east1-c			10.128.0.3 ( <a href="#">nic0</a> )	<a href="#">34.138.113.161</a> ( <a href="#">nic0</a> )	SSH ▾ ⋮

## Replicación activa/pasiva (MySQL)

```
jonasjmx@hospital-principal-quito:~$ sudo systemctl restart mysql.service
jonasjmx@hospital-principal-quito:~$ sudo systemctl status mysql.service
● mysql.service - MySQL Community Server
   Loaded: loaded (/usr/lib/systemd/system/mysql.service; enabled; preset: enabled)
   Active: active (running) since Sun 2025-06-08 16:04:10 UTC; 9s ago
     Process: 9867 ExecStartPre=/usr/share/mysql/mysql-systemd-start pre (code=exited, status=0/SUCCESS)
    Main PID: 9876 (mysqld)
      Status: "Server is operational"
        Tasks: 38 (limit: 2280)
      Memory: 389.0M (peak: 400.8M)
         CPU: 1.812s
      CGroup: /system.slice/mysql.service
              └─9876 /usr/sbin/mysqld
```

Connection Name: Centro Medico Latacunga

Connection

Remote Management

System Profile

Connection Method: Standard (TCP/IP) Method to use to connect to the RDBMS

Parameters

SSL

Advanced

Hostname: 34.23.230.158

Port: 3306

Name or IP address of the server host - and TCP/IP port.

Username: centromedico

Name of the user to connect with.

Password: 

Store in Vault ...

Clear

The user's password. Will be requested later if it's not set.

Default Schema:

The schema to use as default schema. Leave blank to select it later.



```
-- Crear usuario para replicación
-- Este usuario se utiliza para la replicación entre servidores MySQL.
CREATE USER 'replicator'@'%' IDENTIFIED WITH mysql_native_password BY 'Centromedico@123';

-- Otorgar privilegios de replicación al usuario replicator
GRANT REPLICATION SLAVE ON *.* TO 'replicator'@'%';
FLUSH PRIVILEGES;

-- Eliminar usuarios de replicación (opcional, para limpieza)
DROP USER 'replicator'@'%';
FLUSH PRIVILEGES;

-- Bloquear y desbloquear tablas (para sincronización)
FLUSH TABLES WITH READ LOCK;
UNLOCK TABLES;

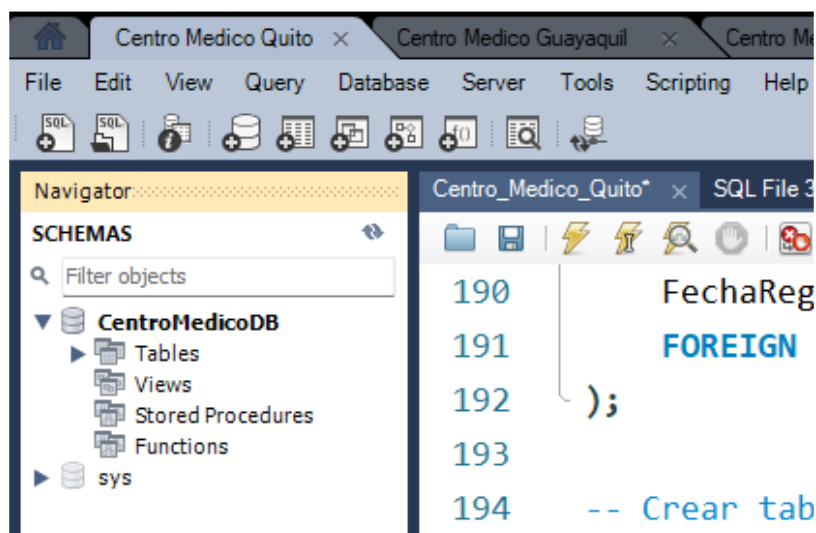
-- Desbloquear IPs bloqueadas (importante en caso de errores de conexión)
FLUSH HOSTS;

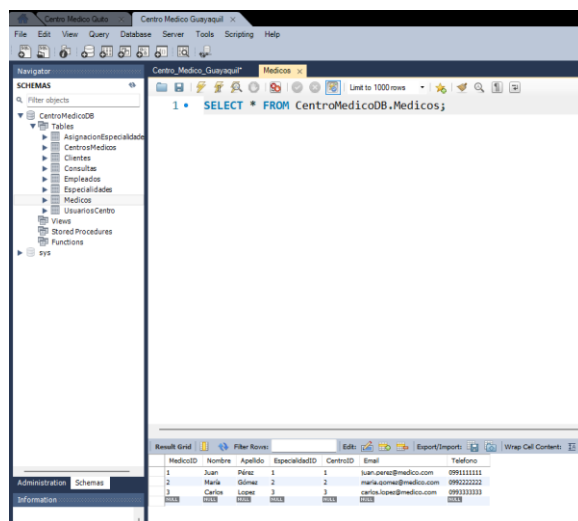
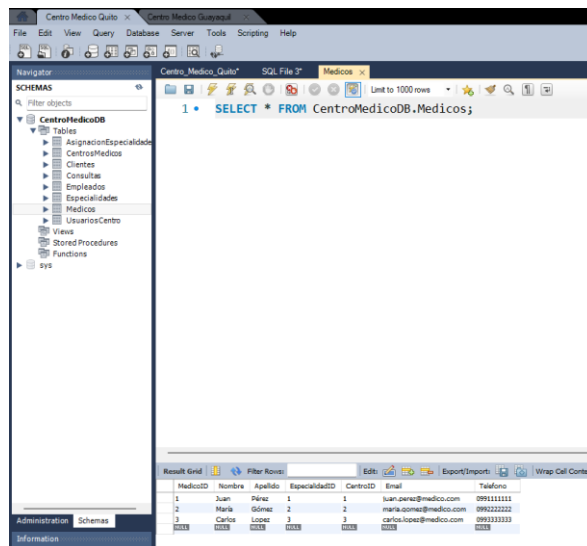
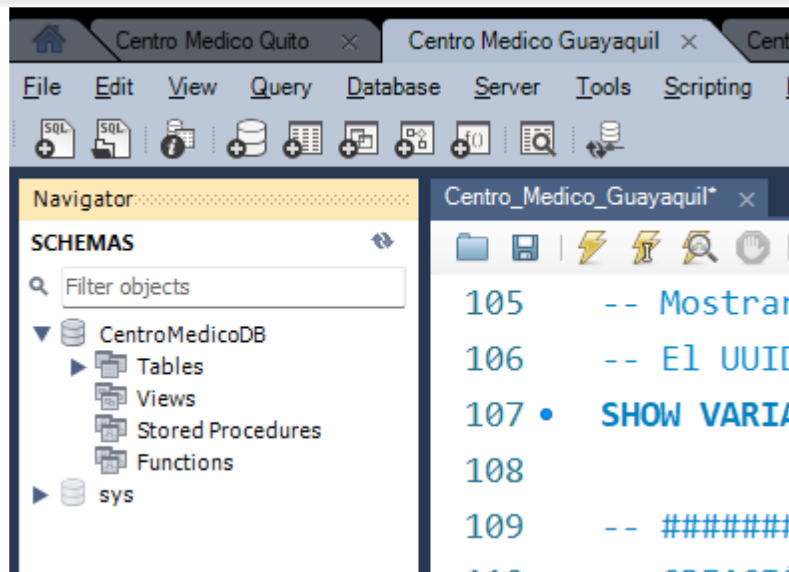
-- Detener el proceso de replicación en caso de que sea necesario realizar ajustes.
STOP SLAVE;

-- Reiniciar la configuración del esclavo para limpiar cualquier configuración previa.
RESET SLAVE ALL;

-- Reconfigurar el esclavo con nuevos valores (si es necesario).
CHANGE MASTER TO
  MASTER_HOST      = '34.138.196.138',          -- Dirección IP o nombre del host del servidor maestro
  MASTER_USER      = 'replicator',              -- Usuario configurado para la replicación en el maestro
  MASTER_PASSWORD  = 'Centromedico@123',        -- Contraseña del usuario de replicación
  MASTER_LOG_FILE  = 'mysql-bin.000003',        -- Archivo de registro binario actual en el maestro
  MASTER_LOG_POS   = 5058;                     -- Posición en el archivo binario del maestro

-- Iniciar nuevamente el proceso de replicación después de la reconfiguración.
START SLAVE;
```







**UNIVERSIDAD TÉCNICA DE AMBATO**  
**FACULTAD DE INGENIERÍA EN SISTEMAS, ELECTRÓNICA E INDUSTRIAL**  
**CARRERA DE SOFTWARE**  
Cda. Universitaria (Predios Huachi)/ Casilla 334/  
Telefax: 03-2851894 – 2411537, Correo Electrónico: carrera.sistemas@uta.edu.ec  
AMBATO-ECUADOR



```
104 • INSERT INTO Medicos (Nombre, Apellido, EspecialidadID, CentroID, Email, Telefono) VALUES
105 ('Ana', 'García', 2, 2, 'ana1.garcia@saludtotal.com', '555-2222'),
106 ('Ana', 'García', 2, 2, 'ana2.garcia@saludtotal.com', '555-2222'),
107 ('Ana', 'García', 2, 2, 'ana3.garcia@saludtotal.com', '555-2222'),
108 ('Ana', 'García', 2, 2, 'ana4.garcia@saludtotal.com', '555-2222'),
109 ('Ana', 'García', 2, 2, 'ana5.garcia@saludtotal.com', '555-2222'),
110 ('Ana', 'García', 2, 2, 'ana6.garcia@saludtotal.com', '555-2222'),
111 ('Ana', 'García', 2, 2, 'ana7.garcia@saludtotal.com', '555-2222'),
112 ('Ana', 'García', 2, 2, 'ana8.garcia@saludtotal.com', '555-2222'),
113 ('Ana', 'García', 2, 2, 'ana9.garcia@saludtotal.com', '555-2222'),
114 ('Ana', 'García', 2, 2, 'ana10.garcia@saludtotal.com', '555-2222');
115
116 -- UsuariosCentro
117 • INSERT INTO UsuariosCentro (CentroID, Email, Contraseña) VALUES
```

Output			
Action Output			
#	Time	Action	Message
✓ 1	08:53:40	SELECT * FROM CentroMedicoDB.Especialidades LIMIT 0, 1000	3 row(s) returned
✓ 2	08:54:41	SELECT * FROM CentroMedicoDB.Medicos LIMIT 0, 1000	3 row(s) returned
✓ 3	08:57:29	INSERT INTO Medicos (Nombre, Apellido, EspecialidadID, CentroID, Email, Telefono) VALUES ('Ana', 'García', 2, 2, 'ana1.garcia@saludtotal.com', '555-...	10 row(s) affected Records: 10 Duplicates: 0 Warnings: 0

MedicoID	Nombre	Apellido	EspecialidadID	CentroID	Email	Telefono
1	Juan	Pérez	1	1	juan.perez@medico.com	0991111111
2	Marta	Gómez	2	2	marta.gomez@medico.com	0992222222
3	Carlos	López	3	3	carlos.lopez@medico.com	0993333333
4	Ana	García	2	2	ana1.garcia@saludtotal.com	555-2222
5	Ana	García	2	2	ana2.garcia@saludtotal.com	555-2222
6	Ana	García	2	2	ana3.garcia@saludtotal.com	555-2222
7	Ana	García	2	2	ana4.garcia@saludtotal.com	555-2222
8	Ana	García	2	2	ana5.garcia@saludtotal.com	555-2222
9	Ana	García	2	2	ana6.garcia@saludtotal.com	555-2222
10	Ana	García	2	2	ana7.garcia@saludtotal.com	555-2222
11	Ana	García	2	2	ana8.garcia@saludtotal.com	555-2222
12	Ana	García	2	2	ana9.garcia@saludtotal.com	555-2222
13	Ana	García	2	2	ana10.garcia@saludtotal.com	555-2222

MedicoID	Nombre	Apellido	EspecialidadID	CentroID	Email	Telefono
1	Juan	Pérez	1	1	juan.perez@medico.com	0991111111
2	Marta	Gómez	2	2	marta.gomez@medico.com	0992222222
3	Carlos	López	3	3	carlos.lopez@medico.com	0993333333
4	Ana	García	2	2	ana1.garcia@saludtotal.com	555-2222
5	Ana	García	2	2	ana2.garcia@saludtotal.com	555-2222
6	Ana	García	2	2	ana3.garcia@saludtotal.com	555-2222
7	Ana	García	2	2	ana4.garcia@saludtotal.com	555-2222
8	Ana	García	2	2	ana5.garcia@saludtotal.com	555-2222
9	Ana	García	2	2	ana6.garcia@saludtotal.com	555-2222
10	Ana	García	2	2	ana7.garcia@saludtotal.com	555-2222
11	Ana	García	2	2	ana8.garcia@saludtotal.com	555-2222
12	Ana	García	2	2	ana9.garcia@saludtotal.com	555-2222
13	Ana	García	2	2	ana10.garcia@saludtotal.com	555-2222



```
# Instead of skip-networking the default is now to listen only on
# localhost which is more compatible and is not less secure.
bind-address            = 0.0.0.0
mysqlx-bind-address     = 127.0.0.1
#
# * Fine Tuning
#
key_buffer_size         = 16M
# max_allowed_packet    = 64M
# thread_stack          = 256K
#
# thread_cache_size     = -1

# This replaces the startup script and checks MyISAM tables if needed
# the first time they are touched
myisam-recover-options  = BACKUP

# max_connections       = 151
# table_open_cache      = 4000

#
# * Logging and Replication
#
# Both location gets rotated by the cronjob.
#
# Log all queries
# Be aware that this log type is a performance killer.
# general_log_file       = /var/log/mysql/query.log
# general_log            = 1
#
# Error log - should be very few entries.
#
log_error = /var/log/mysql/error.log
#
# Here you can see queries with especially long duration
# slow_query_log         = 1
# slow_query_log_file    = /var/log/mysql/mysql-slow.log
# long_query_time        = 2
# log-queries-not-using-indexes
#
# The following can be used as easy to replay backup logs or for replication.
# note: if you are setting up a replication slave, see README.Debian about
# other settings you may need to change.
server-id               = 1
log_bin                 = /var/log/mysql/mysql-bin.log
# binlog_expire_logs_seconds = 2592000
max_binlog_size         = 100M
binlog_do_db            = CentroMedicoDB
# binlog_ignore_db       = include_database_name

"mysqld.cnf" [readonly] 80L, 2294B
```

```
bind-address            = 0.0.0.0
mysqlx-bind-address     = 127.0.0.1
#
# * Fine Tuning
#
key_buffer_size         = 16M
# max_allowed_packet    = 64M
# thread_stack          = 256K
#
# thread_cache_size     = -1

# This replaces the startup script and checks MyISAM tables if needed
# the first time they are touched
myisam-recover-options  = BACKUP

# max_connections       = 151
# table_open_cache      = 4000

#
# * Logging and Replication
#
# Both location gets rotated by the cronjob.
#
# Log all queries
# Be aware that this log type is a performance killer.
# general_log_file       = /var/log/mysql/query.log
# general_log            = 1
#
# Error log - should be very few entries.
#
log_error = /var/log/mysql/error.log
#
# Here you can see queries with especially long duration
# slow_query_log         = 1
# slow_query_log_file    = /var/log/mysql/mysql-slow.log
# long_query_time        = 2
# log-queries-not-using-indexes
#
# The following can be used as easy to replay backup logs or for replication.
# note: if you are setting up a replication slave, see README.Debian about
# other settings you may need to change.
server-id               = 2
log_bin                 = /var/log/mysql/mysql-bin.log
relay-log               = /var/log/mysql/mysql-relay-bin.log
read_only               = 1
# binlog_expire_logs_seconds = 2592000
max_binlog_size         = 100M
binlog_do_db            = CentroMedicoDB
# binlog_ignore_db       = include_database_name

"mysqld.cnf" [readonly] 80L, 2294B
```

## Replicación instantánea, transaccional y merge (SQL Server)

Features:

### Instance Features

- ☒ Database Engine Services
  - ☒ **SQL Server Replication**
  - ☐ Machine Learning Services and Language Ext
  - ☒ Full-Text and Semantic Extractions for Search
  - ☒ Data Quality Services
  - ☐ PolyBase Query Service for External Data
  - ☐ Analysis Services



SQL Full-text Filter Daemon Launcher (INST1DEV)	En ejecución	NT Service\MSSQLFDLauncher\$INST1DEV	Manual
SQL Full-text Filter Daemon Launcher (INST2DEV)	En ejecución	NT Service\MSSQLFDLauncher\$INST2DEV	Manual
SQL Full-text Filter Daemon Launcher (MSSQLSERVER)	En ejecución	NT Service\MSSQLFDLauncher	Automático
SQL Server (INST1DEV)	En ejecución	NT Service\MSSQL\$INST1DEV	Manual
SQL Server (INST2DEV)	En ejecución	NT Service\MSSQL\$INST2DEV	Manual
SQL Server (MSSQLSERVER)	En ejecución	NT Service\MSSQLSERVER	Automático (inicio retrasado)
SQL Server Agent (INST1DEV)	En ejecución	NT Service\SQLAgent\$INST1DEV	Manual
SQL Server Agent (INST2DEV)	En ejecución	NT Service\SQLAgent\$INST2DEV	Manual
SQL Server Agent (MSSQLSERVER)	En ejecución	Sistema local	Automático
SQL Server Browser	En ejecución	Servicio local	Manual
SQL Server CEIP service (INST1DEV)	En ejecución	NT Service\SQLTELEMETRY\$INST1DEV	Manual
SQL Server CEIP service (INST2DEV)	En ejecución	NT Service\SQLTELEMETRY\$INST2DEV	Manual
SQL Server CEIP service (MSSQLSERVER)	En ejecución	NT Service\SQLTELEMETRY	Automático (inicio retrasado)
SQL Server Launchpad (MSSQLSERVER)	En ejecución	NT Service\MSSQLLaunchpad	Automático (inicio retrasado)
SQL Server VSS Writer	En ejecución	Sistema local	Automático

**Sql Server Configuration Manager**  
Archivo Acción Ver Ayuda  
← → 📁 📄 🔍 🔄 ?

	Protocol Name	Status
SQL Server Configuration Manager (Local)		
SQL Server Services		
SQL Server Network Configuration (32bit)	Shared Memory	Enabled
SQL Native Client 11.0 Configuration (32bit)	Named Pipes	Enabled
Azure Extension For SQL Server	TCP/IP	Enabled
SQL Server Network Configuration		
Protocols for MSSQLSERVER		
Protocols for INST2DEV		
Protocols for INST1DEV		
SQL Native Client 11.0 Configuration		
Azure Extension For SQL Server		

**JONASJMX (SQL Server 16.0.1135.2 - sa)**

- Databases
- Security
- Server Objects
- Replication
- Always On High Availability
- Management
- Integration Services Catalogs
- SQL Server Agent
- XEvent Profiler

**JONASJMX\INST1DEV (SQL Server 16.0.1000.6 - sa)**

- Databases
- Security
- Server Objects
- Replication
- Always On High Availability
- Management
- Integration Services Catalogs
- SQL Server Agent
- XEvent Profiler

**Replication**

- Configure Distribution...
- Launch Replication Monitor
- Generate Scripts



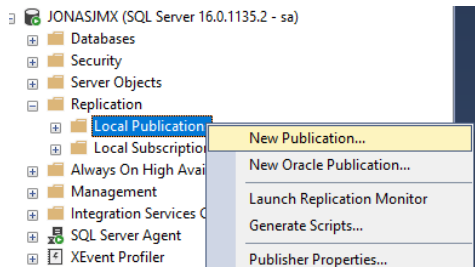


☒ Yes, configure the SQL Server Agent service to start automatically

☐ No, I will start the SQL Server Agent service manually

For the wizard to configure the SQL Server Agent service, the SQL Server service account must have administrator permissions on the server computer. If the service does not have these permissions, you must change the configuration manually.

Help < Back Next > Finish >> Cancel



Publication type:

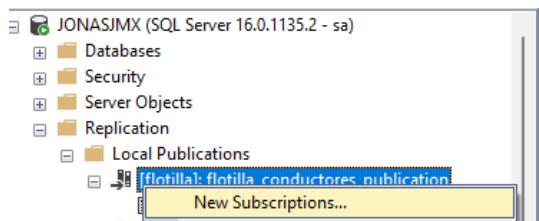
☒ Snapshot publication

**Snapshot Agent**  
Specify when to run the Snapshot Agent.

Subscriptions are initialized with a snapshot of publication schema and data. The Snapshot Agent creates a snapshot.

☒ Create a snapshot immediately and keep the snapshot available to initialize subscriptions

☐ Schedule the Snapshot Agent to run at the following times:



Publisher:

JONASJMX\INST1DEV

<Find SQL Server Publisher...>

<Find Oracle Publisher...>

JONASJMX\INST1DEV

**Subscribers**  
Choose one or more Subscribers and specify each subscription database.

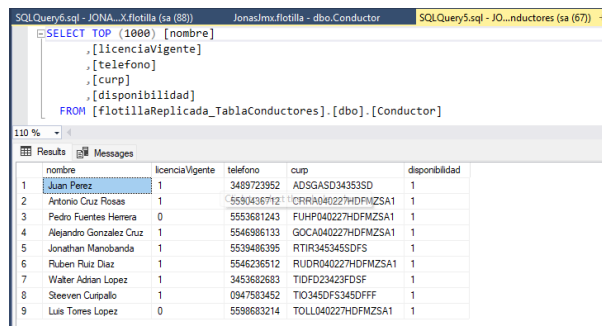
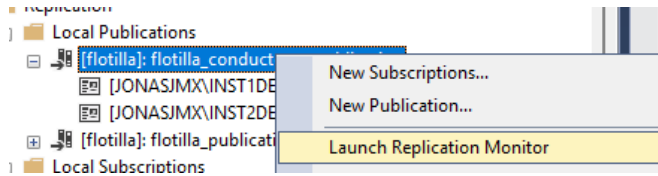
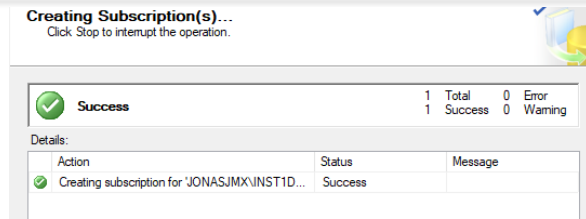
Subscribers and subscription databases:

Subscriber	Subscription Database
<input checked="" type="checkbox"/> JONASJMX\INST1DEV	<div>&lt;New database...&gt; &lt;Refresh database list&gt;</div>

Subscription properties:

Agent for Subscriber	Connection to Distributor	Connection to Subscriber
JONASJMX\INST1DEV	Click (...) to set security op...	Click (...) to set security opti...





## Replicación síncrona (PostgreSQL o Cloud Spanner)

```
jonasjmx@hospital-guayaquil:/etc/mysql/mysql.conf.d$ systemctl status postgresql
● postgresql.service - PostgreSQL RDBMS
   Loaded: loaded (/usr/lib/systemd/system/postgresql.service; enabled; preset: enabled)
   Active: active (exited) since Wed 2025-06-11 14:04:31 UTC; 8min ago
   Main PID: 9909 (code=exited, status=0/SUCCESS)
     CPU: 2ms

Jun 11 14:04:31 hospital-guayaquil.us-east1-c.c.plucky-tract-461200-u4.internal systemd[1]: Starting
Jun 11 14:04:31 hospital-guayaquil.us-east1-c.c.plucky-tract-461200-u4.internal systemd[1]: Finished
jonasjmx@hospital-guayaquil:/etc/mysql/mysql.conf.d$
```

```
#-----
# CONNECTIONS AND AUTHENTICATION
#-----

# - Connection Settings -

#replicacion sincronica
#-----

listen_addresses = '*'
wal_level = replica
max_wal_senders = 10
wal_keep_size = 64
synchronous_commit = on
synchronous_standby_names = 'standby1'

#-----
```



```
# TYPE DATABASE USER ADDRESS METHOD
# "local" is for Unix domain socket connections only
local all all peer
# IPv4 local connections:
host all all 127.0.0.1/32 scram-sha-256
# IPv6 local connections:
host all all ::1/128 scram-sha-256
# Allow replication connections from localhost, by a user with the
# replication privilege.
local replication all peer
host replication all 127.0.0.1/32 scram-sha-256
host replication all ::1/128 scram-sha-256
host replication replicador <IP_STANDBY>/32 md5
```

```
# "local" is for Unix domain socket connections only
local all all peer
# IPv4 local connections:
host all all 127.0.0.1/32 scram-sha-256
# IPv6 local connections:
host all all ::1/128 scram-sha-256
# Allow replication connections from localhost, by a user with the
# replication privilege.
local replication all peer
host replication all 127.0.0.1/32 scram-sha-256
host replication all ::1/128 scram-sha-256
host replication replicador 10.128.0.7/32 md5
```

```
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/postgresql.conf
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/postgresql.conf

jonasjmx@hospital-principal-quito:~$ sudo nano /etc/postgresql/16/main/pg_hba.conf
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/pg_hba.conf
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/pg_hba.conf

jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/pg_hba.conf
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/pg_hba.conf
jonasjmx@hospital-principal-quito:~$ sudo -u postgres psql
psql (16.9 (Ubuntu 16.9-0ubuntu0.24.04.1))
Type "help" for help.

postgres=# CREATE ROLE replicador REPLICATION LOGIN ENCRYPTED PASSWORD 'Postgresql@123';
\q
CREATE ROLE
jonasjmx@hospital-principal-quito:~$ sudo systemctl restart postgresql
```

```
jonasjmx@hospital-guayaquil:~$ sudo rm -rf /var/lib/postgresql/16/main
jonasjmx@hospital-guayaquil:~$ sudo mkdir /var/lib/postgresql/16/main
jonasjmx@hospital-guayaquil:~$ sudo chown postgres:postgres /var/lib/postgresql/16/main
```

```
jonasjmx@hospital-guayaquil:~$ sudo -u postgres pg_basebackup -h 10.128.0.6 -D /var/lib/postgresql/16/main -U replicador -P --wal-method=stream
```

```
in -U replicador -P --wal-method=stream
Password:
23158/23158 kB (100%), 1/1 tablespace
```

```
#-----
# - Connection Settings -

primary_conninfo = 'host=10.128.0.6 port=5432 user=replicador password=Postgresql@123 application_name=standby1'

#listen_addresses = 'localhost' # what IP address(es) to listen on:
```



```
jonasjmx@hospital-principal-quito:~$ sudo systemctl status postgresql
● postgresql.service - PostgreSQL RDBMS
   Loaded: loaded (/usr/lib/systemd/system/postgresql.service; enabled; preset: enabled)
   Active: active (exited) since Wed 2025-06-11 14:42:43 UTC; 3min 43s ago
   Process: 12109 ExecStart=/bin/true (code=exited, status=0/SUCCESS)
   Main PID: 12109 (code=exited, status=0/SUCCESS)
   CPU: 2ms

Jun 11 14:42:43 hospital-principal-quito systemd[1]: Starting postgresql.service - PostgreSQL RDBMS...
Jun 11 14:42:43 hospital-principal-quito systemd[1]: Finished postgresql.service - PostgreSQL RDBMS.
jonasjmx@hospital-principal-quito:~$ sudo -u postgres psql
psql (16.9 (Ubuntu 16.9-0ubuntu0.24.04.1))
Type "help" for help.

postgres=# SELECT * FROM pg_stat_replication;
postgres=# SELECT * FROM pg_stat_replication;
postgres=# \q
jonasjmx@hospital-principal-quito:~$ |
```

```
jonasjmx@hospita X  jonasjmx@hospita X  jonasjmx@hospita X  jonasjmx@hospita X  +  -  X
pid | usesysid | username | application_name | client_addr | client_hostname | client_port |
-----+-----+-----+-----+-----+-----+-----+
 backend_start | backend_xmin | state | sent_lsn | write_lsn | flush_lsn | replay_lsn
| write_lag | flush_lag | replay_lag | sync_priority | sync_state | reply_time
-----+-----+-----+-----+-----+-----+-----+
12484 | 16388 | replicador | standby1 | 10.128.0.7 | | 57542 | 2025
-06-11 14:46:16.259823+00 | | streaming | 0/3000390 | 0/3000390 | 0/3000390 | 0/3000390
| | | 1 | sync | 2025-06-11 14:55:05.640059+00
(1 row)
```

```
jonasjmx@hospital-principal-quito:~$ sudo systemctl stop postgresql
jonasjmx@hospital-principal-quito:~$ sudo -u postgres pg_ctlcluster 16 main promote
pg_ctl: PID file "/var/lib/postgresql/16/main/postmaster.pid" does not exist
Is server running?
jonasjmx@hospital-principal-quito:~$ sudo -u postgres pg_ctl promote -D /var/lib/postgresql/16/main
sudo: pg_ctl: command not found
jonasjmx@hospital-principal-quito:~$ sudo -u postgres psql -c "SELECT pg_is_in_recovery();"
psql: error: connection to server on socket "/var/run/postgresql/.s.PGSQL.5432" failed: No such file or
r directory
Is the server running locally and accepting connections on that socket?
jonasjmx@hospital-principal-quito:~$ |
```

## Réplicas de lectura/escritura en MongoDB

```
jonasjmx@ubuntu-22lts-2:~$ sudo systemctl start mongod
jonasjmx@ubuntu-22lts-2:~$ sudo systemctl enable mongod
Created symlink /etc/systemd/system/multi-user.target.wants/mongod.service → /lib/systemd/system/mongo
d.service.
jonasjmx@ubuntu-22lts-2:~$ sudo systemctl statud mongod
Unknown command verb statud.
jonasjmx@ubuntu-22lts-2:~$ sudo systemctl status mongod
● mongod.service - MongoDB Database Server
   Loaded: loaded (/lib/systemd/system/mongod.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2025-06-11 15:44:59 UTC; 57s ago
     Docs: https://docs.mongodb.org/manual
   Main PID: 6068 (mongod)
    Memory: 70.1M
       CPU: 996ms
   CGroup: /system.slice/mongod.service
           └─6068 /usr/bin/mongod --config /etc/mongod.conf

Jun 11 15:44:59 ubuntu-22lts-2 systemd[1]: Started MongoDB Database Server.
Jun 11 15:44:59 ubuntu-22lts-2 mongod[6068]: {"t":{"$date":"2025-06-11T15:44:59.272Z"},"s":"I", "c":
jonasjmx@ubuntu-22lts-2:~$ |
```



```
# for documentation of all options, see:
# http://docs.mongodb.org/manual/reference/configuration-options/

# Where and how to store data.
storage:
  dbPath: /var/lib/mongodb
  # engine:
# wiredTiger:

# where to write logging data.
systemLog:
  destination: file
  logAppend: true
  path: /var/log/mongodb/mongod.log

# network interfaces
net:
  port: 27017
  bindIp: 0.0.0.0

# how the process runs
processManagement:
  timeZoneInfo: /usr/share/zoneinfo

#security:

#operationProfiling:

replication:
  replSetName: "rs0"

#sharding:

## Enterprise-Only Options:

#auditLog:

#snmp:
```

```
jonasjmx@hospital-guayaquil:~$ sudo vi /etc/mongod.conf
jonasjmx@hospital-guayaquil:~$ sudo systemctl restart mongod
jonasjmx@hospital-guayaquil:~$ mongosh
Current Mongosh Log ID: 6849a5fce8a0d064c069e327
Connecting to: mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
appName=mongosh+2.5.2
Using MongoDB: 6.0.24
Using Mongosh: 2.5.2

For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

To help improve our products, anonymous usage data is collected and sent to MongoDB periodically (https://www.mongodb.com/legal/privacy-policy).
You can opt-out by running the disableTelemetry() command.

-----
The server generated these startup warnings when booting
2025-06-11T15:51:15.861+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
2025-06-11T15:51:17.330+00:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
-----

test> |
```



```
test> rs.initiate({
...   _id: "rs0",
...   members: [
...     { _id: 0, host: "10.128.0.4:27017" },
...     { _id: 1, host: "10.128.0.2:27017" },
...     { _id: 2, host: "10.128.0.3:27017" }
...   ]
... })
{ ok: 1 }
rs0 [direct: other] test> rs.status()
```

```
members: [
  {
    _id: 0,
    name: '10.128.0.4:27017',
    health: 1,
    state: 1,
    stateStr: 'PRIMARY',
    uptime: 315,
    optime: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-06-11T16:19:52.000Z'),
    lastAppliedWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    lastDurableWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    syncSourceHost: '',
    syncSourceId: -1,
    infoMessage: '',
    electionTime: Timestamp({ t: 1749658622, i: 1 }),
    electionDate: ISODate('2025-06-11T16:17:02.000Z'),
    configVersion: 1,
    configTerm: 1,
    self: true,
    lastHeartbeatMessage: ''
  },
  {
    _id: 1,
    name: '10.128.0.2:27017',
    health: 1,
    state: 2,
    stateStr: 'SECONDARY',
    uptime: 183,
    optime: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
    optimeDurable: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-06-11T16:19:52.000Z'),
    optimeDurableDate: ISODate('2025-06-11T16:19:52.000Z'),
    lastAppliedWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    lastDurableWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    lastHeartbeat: ISODate('2025-06-11T16:19:52.858Z'),
    lastHeartbeatRecv: ISODate('2025-06-11T16:19:54.340Z'),
    pingMs: Long('0'),
    lastHeartbeatMessage: '',
    syncSourceHost: '10.128.0.4:27017',
    syncSourceId: 0,
    infoMessage: '',
    configVersion: 1,
    configTerm: 1
  },
  {
    _id: 2,
    name: '10.128.0.3:27017',
    health: 1,
    state: 2,
    stateStr: 'SECONDARY',
    uptime: 183,
    optime: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
    optimeDurable: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-06-11T16:19:52.000Z'),
    optimeDurableDate: ISODate('2025-06-11T16:19:52.000Z'),
    lastAppliedWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    lastDurableWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    lastHeartbeat: ISODate('2025-06-11T16:19:52.866Z'),
    lastHeartbeatRecv: ISODate('2025-06-11T16:19:54.340Z'),
    pingMs: Long('0'),
    lastHeartbeatMessage: '',
    syncSourceHost: '10.128.0.4:27017',
    syncSourceId: 0,
    infoMessage: '',
    configVersion: 1,
    configTerm: 1
  }
],
ok: 1,
'$clusterTime': {
  clusterTime: Timestamp({ t: 1749658792, i: 1 }),
  signature: {
    hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAAAAAAA= ', 0),
    keyId: Long('0')
  }
},
operationTime: Timestamp({ t: 1749658792, i: 1 })
}
rs0 [direct: primary] test>
```



```
jonaajmx@ubuntu-22lts-1:~$ sudo systemctl restart mongod
jonaajmx@ubuntu-22lts-1:~$ mongosh
Current Mongosh Log ID: 6849ada6b63c1193ef69e327
Connecting to:
  mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
  appName=mongosh+2.5.2
Using MongoDB: 6.0.24
Using Mongosh: 2.5.2

For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

To help improve our products, anonymous usage data is collected and sent to MongoDB periodically (https://www.mongodb.com/legal/privacy-policy).
You can opt-out by running the disableTelemetry() command.

-----
The server generated these startup warnings when booting
2025-06-11T15:51:13.658+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
2025-06-11T15:51:15.092+00:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-06-11T15:51:15.092+00:00: vm.max_map_count is too low
-----

rs0 [direct: secondary] test> rs.status()
{
  set: 'rs0',
  date: ISODate('2025-06-11T16:24:08.604Z'),
  myState: 2,
  term: Long('1'),
  syncSourceHost: '10.128.0.4:27017',
  syncSourceId: 0,
  heartbeatIntervalMillis: Long('2000'),
  majorityVoteCount: 2,
  writeMajorityCount: 2,
  votingMembersCount: 3,
  writableVotingMembersCount: 3,
  optimes: {
    lastCommittedOpTime: { ts: Timestamp({ t: 1749659042, i: 1 }), t: Long('1') },
    lastCommittedWallTime: ISODate('2025-06-11T16:24:02.842Z'),
    readConcernMajorityOpTime: { ts: Timestamp({ t: 1749659042, i: 1 }), t: Long('1') },
    appliedOpTime: { ts: Timestamp({ t: 1749659042, i: 1 }), t: Long('1') },
    durableOpTime: { ts: Timestamp({ t: 1749659042, i: 1 }), t: Long('1') },
    lastAppliedWallTime: ISODate('2025-06-11T16:24:02.842Z'),
    lastDurableWallTime: ISODate('2025-06-11T16:24:02.842Z')
  },
  lastStableRecoveryTimestamp: Timestamp({ t: 1749659042, i: 1 }),
  electionParticipantMetrics: {
    votedForCandidate: true,
    electionTerm: Long('1'),
    lastVoteDate: ISODate('2025-06-11T16:17:02.760Z')
  }
}
```

```
jonaajmx@ubuntu-22lts-2:~$ mongosh
Current Mongosh Log ID: 6849add4073c3d258069e327
Connecting to:
  mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
  appName=mongosh+2.5.2
Using MongoDB: 6.0.24
Using Mongosh: 2.5.2

For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

To help improve our products, anonymous usage data is collected and sent to MongoDB periodically (https://www.mongodb.com/legal/privacy-policy).
You can opt-out by running the disableTelemetry() command.

-----
The server generated these startup warnings when booting
2025-06-11T15:51:11.640+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
2025-06-11T15:51:13.079+00:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-06-11T15:51:13.079+00:00: vm.max_map_count is too low
-----

rs0 [direct: secondary] test> rs.status()
{
  set: 'rs0',
  date: ISODate('2025-06-11T16:25:07.969Z'),
  myState: 2,
  term: Long('1'),
  syncSourceHost: '10.128.0.4:27017',
  syncSourceId: 0,
  heartbeatIntervalMillis: Long('2000'),
  majorityVoteCount: 2,
  writeMajorityCount: 2,
  votingMembersCount: 3,
  writableVotingMembersCount: 3,
  optimes: {
    lastCommittedOpTime: { ts: Timestamp({ t: 1749659102, i: 1 }), t: Long('1') },
    lastCommittedWallTime: ISODate('2025-06-11T16:25:02.845Z'),
    readConcernMajorityOpTime: { ts: Timestamp({ t: 1749659102, i: 1 }), t: Long('1') },
    appliedOpTime: { ts: Timestamp({ t: 1749659102, i: 1 }), t: Long('1') },
    durableOpTime: { ts: Timestamp({ t: 1749659102, i: 1 }), t: Long('1') },
    lastAppliedWallTime: ISODate('2025-06-11T16:25:02.845Z'),
    lastDurableWallTime: ISODate('2025-06-11T16:25:02.845Z')
  },
  lastStableRecoveryTimestamp: Timestamp({ t: 1749659102, i: 1 }),
  electionParticipantMetrics: {
    votedForCandidate: true,
    electionTerm: Long('1'),
    lastVoteDate: ISODate('2025-06-11T16:17:02.760Z')
  }
}
```

Carpeta de capturas y evidencia con comandos y código:

<https://github.com/jonasjmx/Prueba-BDD-2do-parcial>